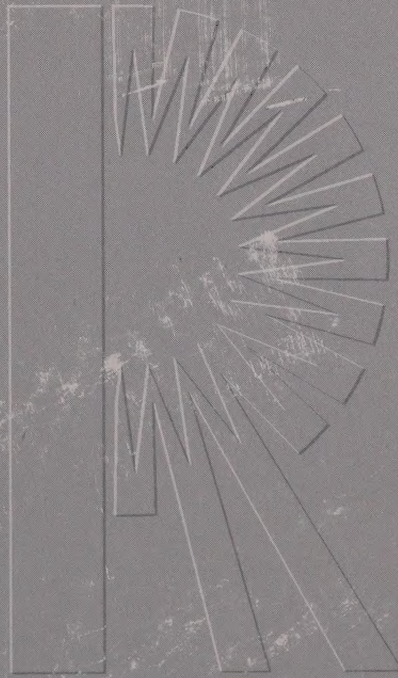
POWER METER

555B
557B
558B



Instruction Manual

POWER METER

555B
557B
558B

RIFOCS
CORPORATION

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Doc No: 0555-09

UNIQUE!!!!

RIFOCS Snap-On Connector (SOC) Interface adapters for ...

1001 **Blank Adapter** -for custom design applications
1010 **DIN 47256**
1020 **FC-PC / FC-APC**
1030 **ST**
1038 **38999 Contact Receptacle**
1040 **Diamond HMS-10HP**
1050 **Diamond HMS-0 (3.5mm)**
1062 **SC-PC / APC**
1081 **Radiall VFO**
1082 **Biconic**
1086 **Diamond HMS-10/A (2.5mm SMA)**
1087 **SMA 905/906**
1089 **D4**
10E0 **Radiall EC**
10TB **Toshiba Simplex Toslink™**
10ZP **Ensign-Bickford Z-Pin/H-P Versalink**

Optical Power Meter 555B 557B 558B

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INTRODUCTION

The RIFOCS 550B series of true palm-sized optical power meters cover the full range of optical fiber applications. These instruments were engineered for field and lab personnel requiring a high performance, cost effective, compact and rugged OPM.

All 550B series power meters utilize the RIFOCS Snap-On Connector (SOC) interface. All industry standard fiber optic connectors can be accommodated via a complete line of snap-on adapters.

This extraordinary design combines a state-of-the-art signal processor and microcomputer electronics to provide superb performance as well as simple and elegant operation with just three controls: ON/OFF, dBm/dB and λ.

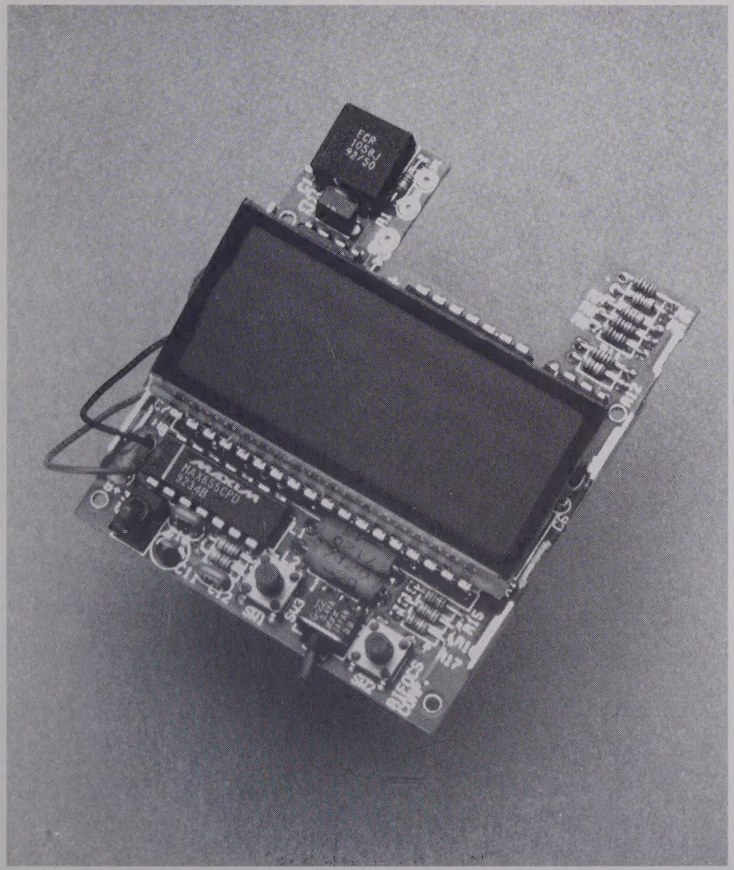
Three models cover all applications:

- **555B** for general purpose fiber optic applications.
- **557B** for near-infrared and visible applications.
- **558B** for high-powered CATV systems as well as Optical Amplifiers, YAG and Diode Pumped Lasers.

SPECIFICATIONS

MODEL	555B	557B	558B
Sensor Type	InGaAs (1mm)	Si (3mm)	InGaAs (1mm)
Power Range	+3 to -60dBm	+3 to -60dBm	+20 to -40dBm
Cal Wavelength (nm)	850/1300/1550	630/780/850	850/980/1300/1480/1550
Absolute Accuracy	±0.25dB at Calibrated Conditions		
Internal Resolution	±0.01dB		
Display	Custom tri-plexed liquid crystal display with 4-digit data field (0.01dB resolution) and simultaneous display of cal wavelength. Display incorporates the following distinct annunciators: 630, 780, 850, 1300, 1550, dB, dBm, B (LowBat) and C (CAL)		
Functions	dBm (Absolute power) dB (Relative power) λ (Select Cal Wavelength plus function allowing user to set default/power-up cal wavelength from front panel) CAL (Calibrate unit)		
Calibration Data	Data stored in non-volatile memory		
Recalibration	Unit can be recalibrated by user, following published procedures and controlled via CAL override switch accessible from battery compartment.		
Connector Interface	RIFOCS Snap-On Connector (SOC) Interface. Supports over 20 industry-standard connectors. See ordering information.		
Power	Requires 2 AA alkaline batteries (> 100 hours battery life)		
Environmental Operating Storage	 -15°C to +50°C , 0-95% RH (Non-condensing) -35°C to +70°C , 0-95% RH (Non-condensing)		
Weight/Dimensions Basic Instrument Shipping Weight	 160g (5.5oz) 60 x 140 x 25mm 350g (12oz) 140 x 240 x 35mm		

Specifications subject to change without notice



The palm-sized 555B OPM incorporates a state-of-the-art InGaAs photodiode for optimum long wavelength performance. InGaAs provides wide dynamic range and improved temperature stability versus Ge detectors. This extraordinary design combines a state-of-the-art signal processor and microcomputer electronics to provide superb performance as well as simple and elegant operation with just three controls: ON/OFF, dBm/dB and λ. The 555B also features non-volatile memory together with an internal CAL function allowing the user the option of recalibrating in his/her own lab, by an independent laboratory, or by RIFOCS. The 555B is powered by two common AA penlight batteries which provides over 100 hours of portable life. The custom LCD provides simultaneous display of both wavelength and dBm/dB units as well as battery status. Together with the RIFOCS 155B Fiber Tracer, 250A Series LED Sources, or 260A Series Laser Sources, the fiber optic technician possesses the smallest and highest performance fiber optic test set in its class.

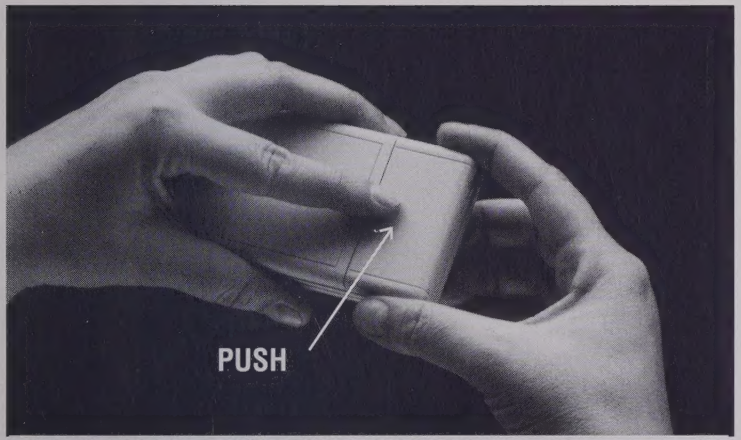
OPERATION

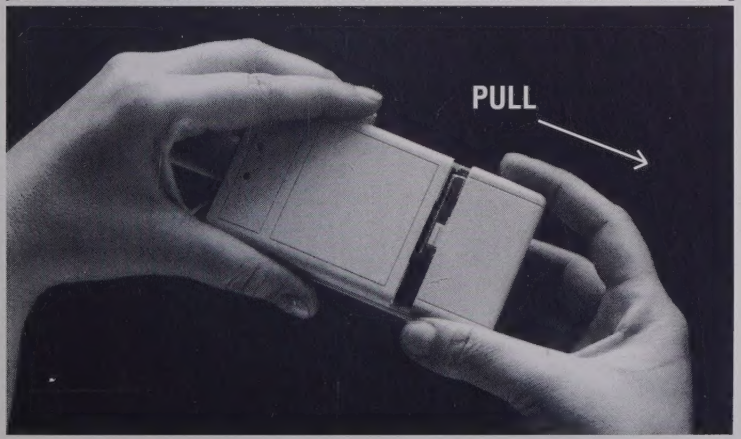
GENERAL

This section describes how to use the 555B OPM. We suggest that you take the time to read this material carefully, so that you can take full advantage of the wide variety of applications for this instrument. If you are required to service and maintain this instrument, then please inquire at RIFOCS CORP., or your local representative, for a complete technical documentation package.

UNPACKING AND INCOMING INSPECTION

Your instrument was shipped with one or more adapters (as specified at time of order), two AA batteries, 910 Pouch, Warranty Registration Card and this instruction booklet. Check the shipment carefully and immediately contact your place of purchase or RIFOCS CORP. directly, if anything is missing or damaged. Returns must be shipped in the original packaging accompanied with a valid return authorization. Consult warranty statement on page 21 for return procedures.





BATTERY INSTALLATION OR REPLACEMENT

The 555B is designed to operate on two common, inexpensive 1.5V AA batteries. The instrument comes with 2 batteries which must first be installed. With long life alkaline batteries, your instrument will typically operate for more than 120 hours. The typical operating life will be about 80 hours for carbon zinc batteries.

LOW BATTERY status is indicated by a "B" annunicator which appears in the upper lefthand region of the LCD. When the "B" first appears, the operator has at least five hours before the batteries must be replaced.

To replace the battery, turn the instrument on its front face and remove the battery cover by pressing on the center of the cover while pulling on its sides.

Remove the used batteries and replace them with new batteries. Observe the correct polarization as indicated in the bottom of the battery compartment. Failure to properly install the batteries in the correct orientation may cause damage to the instrument.

INTERCHANGING THE CONNECTOR ADAPTER

The 555B OPM is equipped with the unique RIFOCS Snap-On Connector (SOC) Interface which allows the user to quickly adapt to all popular industry standard fiber optic connectors. Select the appropriate adapter and attach it to the front end of the 555B as follows:

1. Align the slot in the adapter with the pin on the instrument interface.

2. Push the adapter until it snaps in place.

REMOVAL:

The SOC adapters fit firmly on the unit. To remove you must pull hard on the adapter until it comes off the unit.

Please refer to page 17 for a list of available adapters. For additional information or other connector types contact RIFOCS CORP. or your nearest RIFOCS CORP. Representative.

BASIC OPERATION

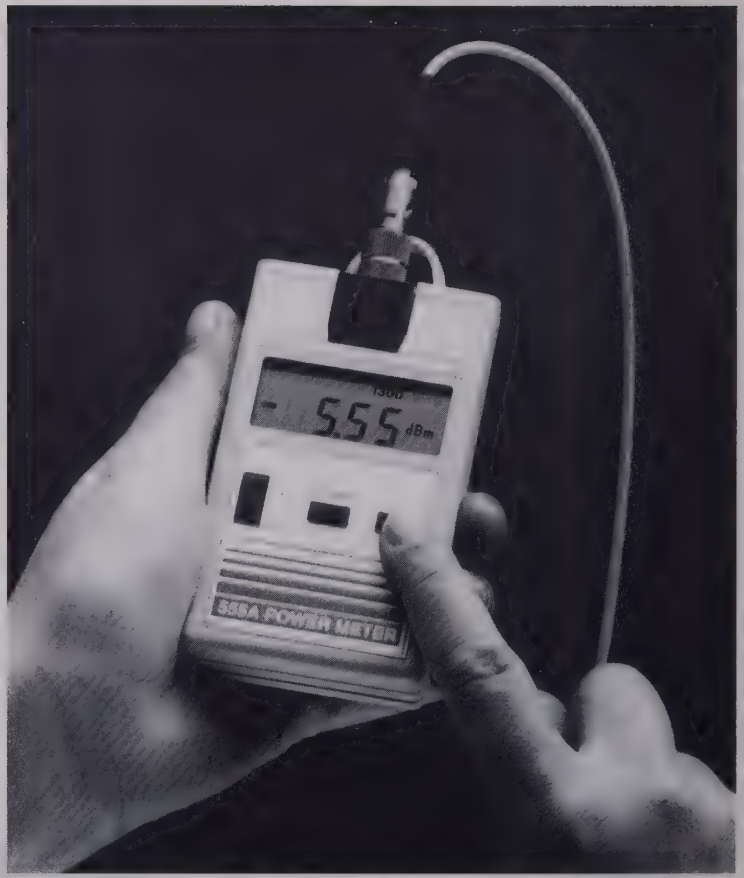
Connect the fiber to be tested and slide the power switch to the ON position. The liquid crystal display will become activated in the dBm mode at the default Cal Wavelength.

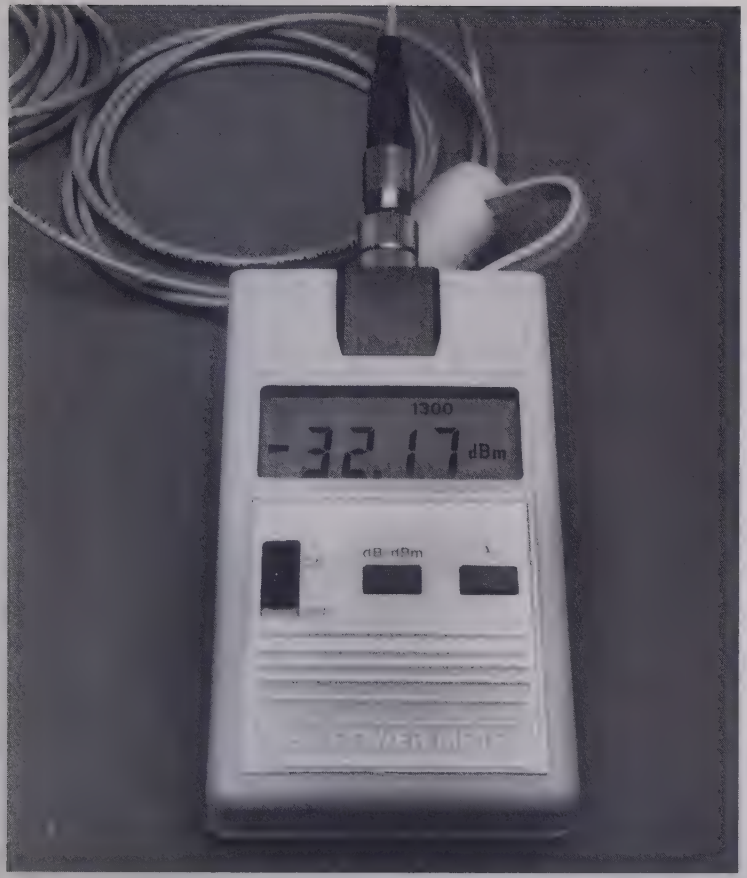
SELECTING ALTERNATE CALIBRATION WAVELENGTHS

To select an alternate Calibration Wavelength, push the [λ] button until the desired wavelength appears.

SETTING A NEW DEFAULT CALIBRATION WAVELENGTH

The default Calibration Wavelength is the reference wavelength that appears when the 555B is turned ON. To set a new default wavelength, push and hold the [λ] button at the desired wavelength. Then momentarily depress the [dBm/dB] button to store this wavelength setting into internal non-volatile memory. The new default Calibration Wavelength has now been set.





MEASURING ABSOLUTE SIGNAL LEVEL IN dBm UNITS

With the proper Cal Wavelength selected, depress the [dBm/dB] button until the "dBm" unit appears on the display. Each time you depress this button the 555B OPM will alternate between the dBm absolute measurement mode and the dB relative measurement mode.

$$dBm = 10 * \log_{10} \frac{P_{in}\,[mW]}{1[mW]}$$

$$dB = 10 * \log_{10} \frac{P_{in}\,[mW]}{P_{out}\,[mW]}$$

ABSOLUTE / RELATIVE TOGGLE MODE

Every time the [dBm/dB] button is momentarily depressed, the OPM display reading will alternate between the dBm absolute measurement mode and the dB relative mode. This "toggling" function does not disturb the current 0.00dB reference level unless the button is held down for more than 2-3 seconds. (See next section, MEASURING RELATIVE SIGNAL CHANGE IN dB UNITS).

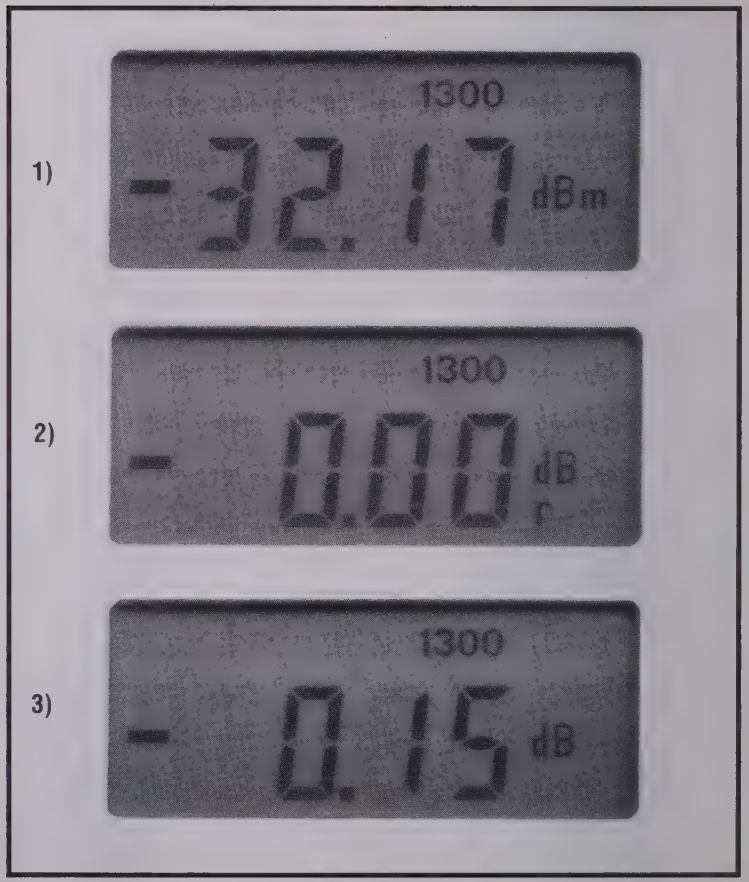
MEASURING RELATIVE SIGNAL CHANGE IN dB UNITS

To measure signal change or attenuation from an initial level, first configure your test setup and the 555B displays the dBm power reading of the reference level or initial test conditions. Then follow these steps:

1) Be sure the 555B is set to the proper Calibration Wavelength and is reading the absolute input level in dBm units.

2) Depress [dBm/dB] button for about 2-3 seconds until the small "r" annunciator appears below the dB annunciator. The instrument will display 0.00 dB referenced to the current dBm input level. Note that the OPM reading may move several counts up and down around zero if the meter detects minor fluctuations in the input signal.

3) As the input signal level changes as you change the initial test conditions (vary power with attenuator, measure insertion loss, etc.), the 555B will display the dB signal change to be interpreted as shown on the following page (10):



- ***POSITIVE***

  dB readings denote an increase or gain in signal level

- ***NEGATIVE***

  dB readings denote a decrease or loss in signal level. If you discard the minus sign, you are observing the transmission loss value.

For a complete discussion on loss measurements see page 15. For a quick introduction, follow this example using the RIFOCS 255A 1300nm LED Source:

Example: Measure the loss of an optical link (62.5/125μm) with 2 connectors in the path. Connectors used are of the ST type.

1) Use the 1030 SOC adapter for 555B OPM and ATS-16 UCI adapter with the 255A Source. Set the 255A Source to CW mode (center position).

2) Connect the cable under test between the OPM and Source.

3) At the far end of the link measure the power using the RIFOCS 555B Power Meter. Set the wavelength to 1300nm and read off power level in dBm: -23.50dBm.

4) Subtract: -20.00dBm - -23.50dBm = 3.50dB The loss of this link is 3.50dB (±0.5dB)

RE-CALIBRATING THE OPM

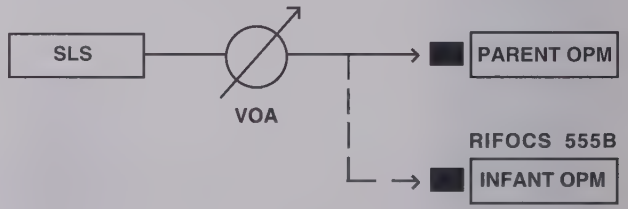
The RIFOCS 555B Optical Power Meter was designed to provide the utmost flexibility to the end user. The 555B features internal non-volatile memory together with an internal CAL function allowing the user the option of recalibrating the instrument in his/her own lab, by an independent laboratory, or by RIFOCS.

To re-calibrate to RIFOCS specifications, the user must first have suitable equipment and standards. The following equipment is required:

CAUTION

The following procedure should only be executed by experienced calibration equipment. Failure to heed this warning may result in an improper calibration which can cause the 555B OPM to produce erroneous power readings.

Assemble the calibration equipment as follows:



REQUIRED EQUIPMENT

1) Stabilized Light Source (SLS): A stable, narrow band light source (filtered LED or laser) of the central wavelength characteristics equal to the desired Calibration Wavelength setting.

2) Variable Optical Attenuator (VOA): A variable optical attenuator to adjust the output level to -30.00dBm.

3) Standard OPM (Parent OPM): A certified, calibrated InGaAs detector or equivalent optical power meter (RIFOCS 575L) calibrated by either a national standards laboratory (such as the U.S. National Institute of Standards and Technology, U.K. National Physical Laboratory, etc.) or a nationally accredited calibration laboratory. The measurement uncertainty at the desired Cal Wavelength should not exceed ±0.1dB, or 2%.

4) Infant OPM: A 555B OPM designated for re-calibration.

Note:
The 558B high power version requires -10dBm reference power

PROCEDURE

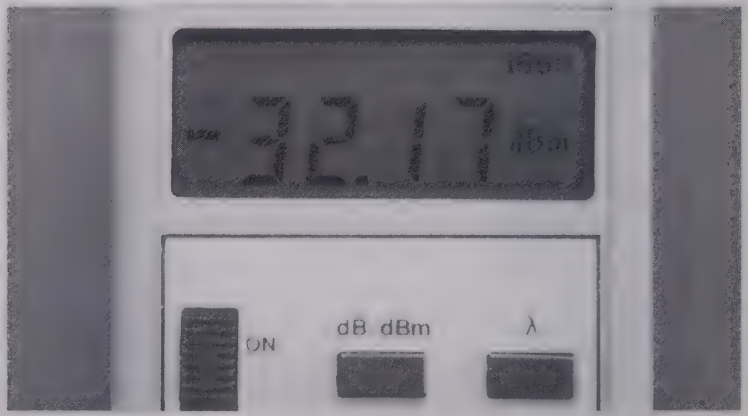
1) Connect output of VOA to input of STANDARD OPM. Adjust output for reading of -30.00dBm (1.00μW)

2) Set CAL switch on 555B to the CAL position by following these steps: (A) Turn the 555B OFF, (B) Open battery compartment and remove batteries, (C) Set the CAL switch to CAL ON, and (D) Re-install the batteries and close battery compartment, and (E) Turn 555B ON again. Note the appearance of the "C" annunciator in the bottom left hand corner of display indicating the active CAL (calibration) mode.

3) Connect the output of the VOA to the input of the 555B (with the appropriate SOC Adapter). Select proper Cal Wavelength by depressing the [λ] button.

In general, the 555B should read-30.00 dBm (±0.1dB). If not, the calibration technician should review his setup for proper wavelength setup, condition of the patch cords, condition of the instrument, etc. Any deviation from -30.00dBm would indicate that previous measurements may reflect this offset error.

4) To recalibrate, momentarily depress [dBm/dB]. The instrument will now read -30.00dBm and is internally recalibrated for that specific Cal Wavelength.



CAUTION

Do not press the (dBm/dB) button to perform the actual recalibration without a final review of the calibration setup. Be sure to verify the following:

- **Source wavelength and 555B Cal Wavelength setting are the same.**
- **Input level to OPM has been precisely adjusted to -30.00dBm (1.00μW).**

NOTE:

The Calibration procedure may be repeated as often as required.

5) Repeat steps 1-4 for the other Cal Wavelengths. Then turn the 555B OFF.

6) Reset the CAL switch to the ON position by following these steps:

(A) Turn the 555B OFF
(B) Open battery compartment and remove batteries
(C) Set the CAL switch to OFF
(D) Re-install the batteries and close battery compartment
(E) Turn 555B ON again.

Note the disappearance of the "C" annunciator (CAL mode inactive).

APPLICATIONS

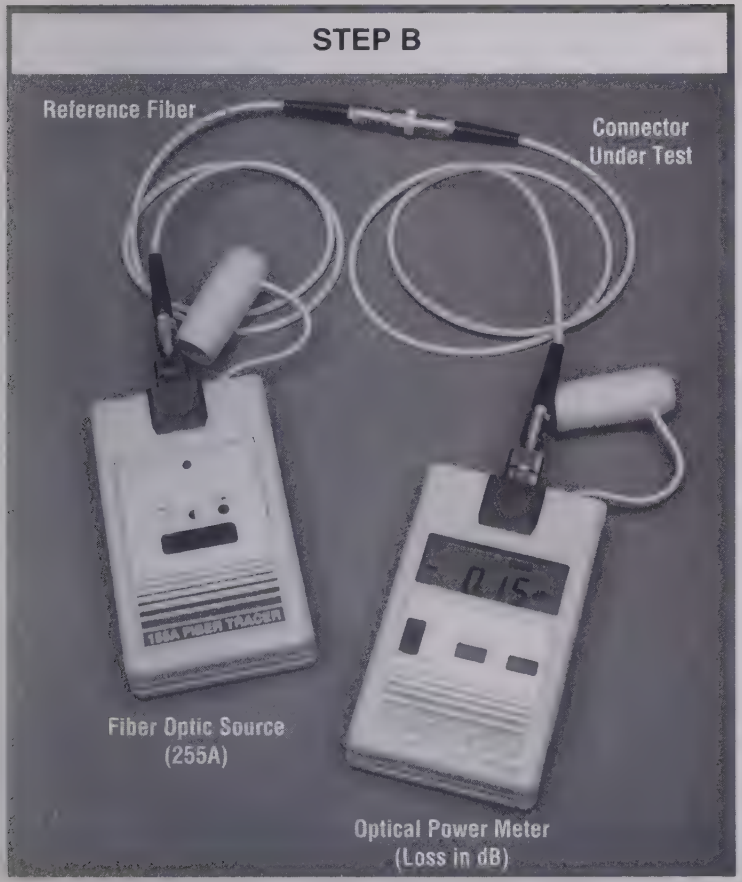
INSERTION LOSS TEST

Fiber optic insertion loss tests typically require a source and a power meter. The Electronic Industries Association (Washington, D.C. @ 202/457-4966) offers a comprehensive library of industry approved Fiber Optic Test Procedures (FOTPs). For a detailed description of various loss measurement methods, consult :

FOTP-34 INTERCONNECTION DEVICE INSERTION LOSS TEST

FOTP-171 ATTENUATION BY SUBSTITUTION MEASUREMENT - FOR SHORT-LENGTH MULTIMODE GRADE INDEX AND SINGLE-MODE OPTICAL FIBER ASSEMBLIES

The RIFOCS 250A series LED SOURCES serve as precision light sources to provide accurate loss measurements for any fiber optic installation. When measuring 62.5/125μm GI (Graded Index) fiber, no special mode filter is required, since the output of these instruments provides a near equilibrium mode distribution.



To measure the insertion loss of a connector (re: FOTP-34 Method A), follow the procedure described below:

A) Connect the RIFOCS 255A 1300nm LED Source to the 555B Optical Power Meter (or equivalent InGaAs OPM) using a suitable REFERENCE CABLE, with a length of about 6 feet (2 meters). Switch the 255A to continuous (CW) light output and the 555B to 1300nm. Note the dBm power output of the reference cable. This reading should be approximately -33 to -38dBm.

B) Press the [dBm/dB] button to internally store the reference value in the power meter. The 555B should now display 0.00dB.Now disconnect the cable from the power meter and insert your cable to be measured. The negative dB readings of the 555B OPM reveals the cable loss at a wavelength of 1300nm. This example shows a connector loss of 0.15dB.

ACCESSORIES

ADAPTERS

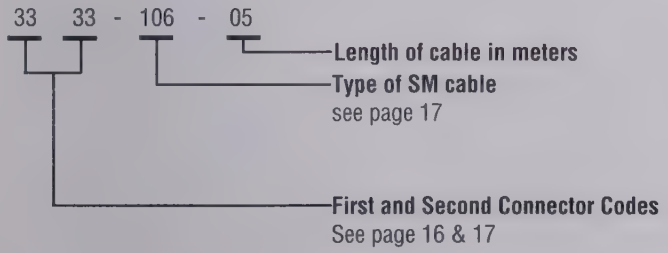
At the time of printing the following adapters are available. Please contact RIFOCS CORP. or your local representative if you can not find the desired adapter.

1001 Blank Adapter -for custom design applications
1010 DIN 47256
1020 FC-PC / FC-APC
1030 ST
1038 38999 Contact Receptacle
1040 Diamond HMS-10HP
1050 Diamond HMS-0 (3.5mm)
1062 SC-PC / APC
1081 Radiall VFO
1082 Biconic
1086 Diamond HMS-10/A (2.5mm SMA)
1087 SMA 905/906
1089 D4
10E0 Radiall EC
10TB Toshiba Simplex Toslink™
10ZP Ensign-Bickford Z-Pin/H-P Versalink

These adapters are of highest quality and accommodate both Singlemode and Multimode Connectors and are also used on compatible fiber optic instruments such as the **RIFOCS 555B Optical Power Meters and 575/577/578 Bench Top OPMs.**

ORDERING INFORMATION

To order cable assemblies, specify your requirements using the RIFOCS order code. The following example specifies a 5m MM jumper cable terminated at both ends with ST Connector (HBT-10):



Test Cables

RIFOCS CORP. maintains a state of the art fiber optic termination laboratory. Any custom cable can be fabricated quickly. These precision test cables are of highest quality suitable for the most demanding measurement applications.

Popular 2m Multimode 62.5/125 configurations include:

2323-106-05	FC-PC to FC-PC, MM
3333-106-05	ST-PC to ST-PC, MM
6363-106-05	SC-PC to SC-PC, MM
8787-106-05	SMA to SMA, MM

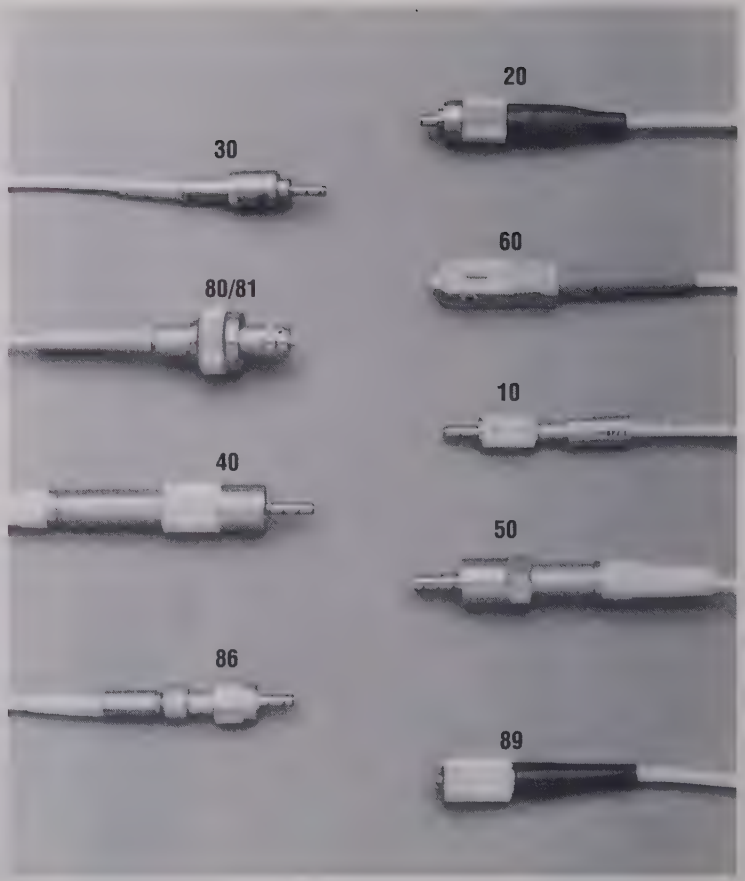
Popular 5m Singlemode (3m for APC cables) jumper cable configurations include:

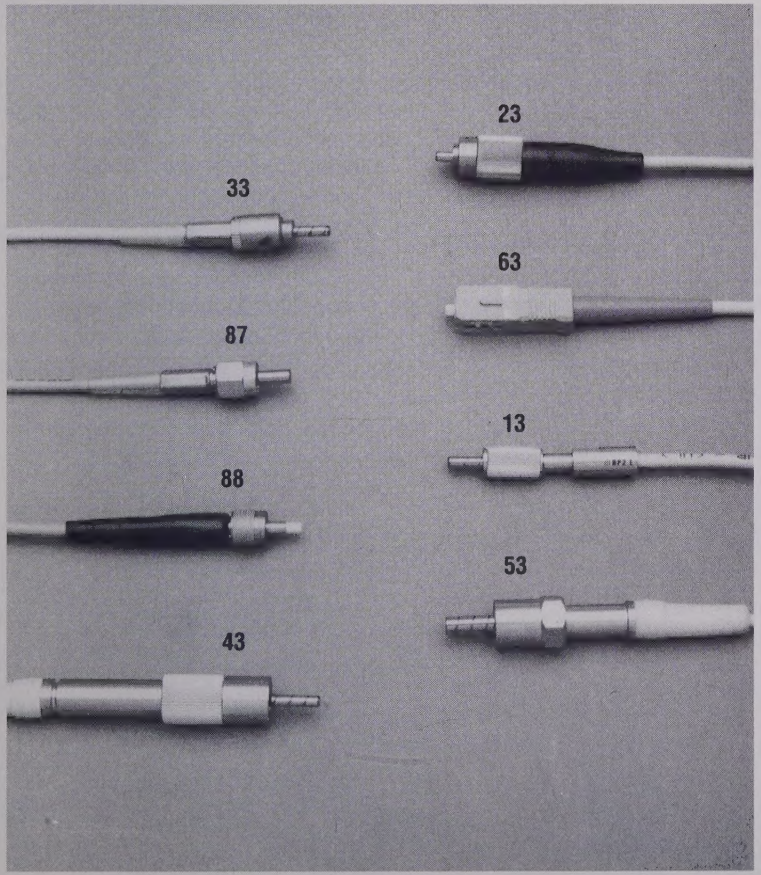
2020-101-05	FC-PC to FC-PC, SM
2121-101-03	FC-PC to FC-APC, SM
3030-101-05	ST-PC to ST-PC, SM
6060-101-05	SC-PC to SC-PC, SM

Most popular connectors are available, please select from the following pages and assemble your own part numbers.

SINGLEMODE CONNECTORS

Name	*Code*	*Part No*	*Manufacturer*
FC-PC	20	HPC-10	DIAMOND
ST-PC	30	HBT-10	DIAMOND
SC-PC	60	SSC-P3	SEIKO
D4-PC	89	SDP-1	SEIKO
DIN-PC	10	D-2106	DIAMOND
HP-PC	40	HMS-10	DIAMOND
DIAMOND	50	HMS-0	DIAMOND
BICONIC	82	02-00160	3M/DORRAN
VFO	81	VFO Flat Pol	RADIALL
VFO/DF	80	DF Slant Pol	RADIALL
SMA	86	HMS-10/A	DIAMOND
IC-2.5	90	Instru. Conn.	DIAMOND
——	00	No connector	





MULTIMODE CONNECTORS

Name	*Code*	*Part No*	*Manufacturer*
FC-PC	23	HPC-10	DIAMOND
FC-NC	25	HFC-13	DIAMOND
ST-PC	33	HBT-10	DIAMOND
ST-NC	35	HST-13	DIAMOND
SC-PC	63	SSC-P3	DIAMOND
SMA-905	87	HMS-25/A	DIAMOND
SMA-905	84	SMA-905	OFTI
SMA-906	88	SMA-906	OFTI
DIN-PC	13	D-2106	DIAMOND
HP-PC	43	HMS-10	DIAMOND
DIAMOND	53	HMS-0	DIAMOND
BICONIC	83	01-00055	3M/DORRAN
IC-2.5	91	Instru. Conn.	DIAMOND

CABLE TYPE

When not otherwise specified, SIECOR cable is used.

Code Description

101 SM, SMF-28, 9/125/900/3000 cable
105 MM, 50/125/900/3000 cable
106 MM, 62.5/125/900/3000 cable
110 MM, 100/140/900/3000 cable
201 SM, Duplex 9/125/900/3000 ZIP
206 MM, Duplex 62.5/125/900/3000 ZIP cord

Ask for availability of other cables not listed above.

STATEMENT OF WARRANTY

RIFOCS Corp. warrants this product to be free from defects in material and workmanship for a period of 1 (one) year from date of shipment. During the warranty period, we will, at our option, either repair or replace any product that proves to be defective.

To exercise this warranty, write or call your local RIFOCS Corp. Representative, or contact RIFOCS Corp. Headquarters. You will be given prompt assistance and return instructions. Send the instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument returned, transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days.

Limitation of Warranty

This warranty does not apply to defects resulting from unauthorized modification or misuse of any product or part. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability of fitness for a particular use. RIFOCS Corp. shall not be liable for any indirect, special or consequential damages.

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550 Series Optical Power Meter Errata Notice : 553B

The 553B Optical Power Meter is used together with the 253B, a 665nm LED Source, to measure end-to-end link loss of the Hewlett-Packard 660nm HFBR-0501 Series VERSATILE LINK, the SPECTRAN V-PIN/Z-PIN Crimp and Cleave Connector System and the TOSHIBA TOSLINK/SPECTRAN J-PIN System.
The 553B has a dynamic range of +3dBm to -60dBm and incorporates a large area 3.5mm diameter silicon detector which can accommodate all large core plastic and silica fibers up to 1mm diameter. Especially suited for high power CATV systems as well as Optical Amplifiers, YAG and Diode pumped lasers.

Specifications 553B

Sensor Type	Si (3.5mm)	
Power Range	+3 to -60dBm	
Calibrated Wavelenghts	630 / 780 / 850 nm	
Absolute Accuracy	± 0.25dB at Calibration Conditions	
Display	Custom tri-plexed liquid crystal display with 4-digit data field (0.01dB resolution) and simultaneous display of calibrated wavelenght. Display incorporates the following distinct annunciators : 630,780,850, 1300, 1550, dB, dBm, B(LowBat) and C (CAL).	
Function	dBm	Absolute Power
	dB	Relative Power
	λ	Select CAL Wavelenght also used to set default/CAL Wavelenght
	CAL	Calibrate Unit

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